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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/566,316

02/14/2006

Derek D. Hass

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EXAMINER

CHEN, BRET P

ART UNIT

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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/566,316	<b>Applicant(s)</b> HASS ET AL.	
	<b>Examiner</b> Bret Chen	<b>Art Unit</b> 1792	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 1-57 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-57 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 28 July 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
  3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)                                | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. ____. |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                       | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date ____. | 6) <input type="checkbox"/> Other: ____.  |

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### **DETAILED ACTION**

Claims 1-57 are pending in this application, which is a 371 of PCT/US2004/024232.

#### ***Claim Rejections - 35 USC § 112***

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

**Claims 1, 3, 5, 22, 39, 41, 43, 52 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.**

In claim 1 line 13, the phrase “one carrier gas stream has a pressure ratio in the operating range of ....” is deemed vague and confusing as to what is the ratio in comparison with. It is not clear whether the ratio is in comparison with the pressure listed in lines 3-4 or with the evaporated vapor flux. Clarification is requested. The same issue applies to claims 3, 5, 22, 39, 41, 43, 52.

#### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any

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evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

**Claims 1-9, 12, 15, 18-19, 39-51 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hass et al. (J. Vac. Sci. Technol. article) alone or when taken in view of Wadley et al. (5,534,314).** Hass discloses an electron beam physical vapor deposition process for forming thermal barrier coatings by combining low vacuum with a carrier gas jet to rapidly transport the evaporant to the deposition surface (abstract). A nickel aluminide bond coat is first formed on the surface followed by yttria partially stabilized zirconia (YSZ) with the expressed purpose of increasing adhesion of the YSZ to the component (p.3396 col.1 and p.3397 col.2). Figure 2 shows a downstream pressure of 0.01-5 Torr (1.3 - 666 Pa) which overlaps with the claimed range of 0.0001 - 150 Pa. The evaporated material is entrained in the carrier gas jet which is emitted from a nozzle and irradiated by an electron beam (p.3397 col.2 and Figure 2). The pressure ratio of the gas jet can be 6.0 and the substrate temperature can be 1000°C (p.3398 col.1). The carrier gas stream appears to be parallel to the main direction and encompasses the generated vapor flux which deposits onto the substrate at a high rate and with a high materials utilization efficiency (p.3397 col.2 and Figure 2). However, the reference remains silent on the evaporation rate.

It is noted that Hass teaches the same EV-DVD process with the same evaporation system and temperature and pressure. One skilled in the art would reasonably expect that the evaporation rate would be similar to that of the claimed invention since every parameter appears to be the same.

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Regardless, Wadley teaches a similar process for directed vapor deposition using an electron beam evaporant which makes efficient use of evaporant source materials and provides rapid deposition (col.4 lines 39-42). In one embodiment, Wadley teaches different evaporation rates depending on the material and can be influenced by specific process parameters including temperature and pressure (col.11 line 37 - col.12 line 10). Typical evaporation rates range from 7.45 - 4333.5 g/min (Table 1). One skilled in the art would realize that the applicant's claimed evaporation rate is well within conventional rates as listed in Wadley. Hence, it would have been obvious to incorporate the evaporation rates of Wadley in the process of Hass with the expectation of success.

In addition, the reference fails to teach at least one evaporant source is disposed in the nozzle. Hass teaches in Figure 2 that the carrier gas mixture of helium and oxygen are mixed in a mixing chamber and ejected from the nozzle to entrain the vapor flux thus reducing the spread (p.3397 col.2 and Figure 2). The vaporized material is simultaneously bombarded by the electron gun and subsequently deposited on the substrate (p.3397 col.2 and Figure 2). One skilled in the art would realize that the source material mixes with the carrier gas mixture prior to deposition onto the substrate surface. It would have been obvious to incorporate the evaporant source in the nozzle in the process of Hass with the expectation of obtaining similar results because the incorporation would lead to mixing prior the deposition onto the substrate surface.

Additionally, it is noted that the downstream pressure of 0.01-5 Torr (1.3 - 666 Pa) overlaps with the claimed range of 0.0001 - 150 Pa. Overlapping ranges are *prima facie* evidence of obviousness. It would have been obvious to one having ordinary skill in the art to have selected the portion of Hass's pressure range that corresponds to the claimed range.

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Regarding claims 2-6, Hass teaches a substrate temperature of 1000°C as noted above.

Regarding claim 3, Hass teaches an overlapping down stream pressure and the appropriate pressure ratio as noted above.

Regarding claim 5, Hass teaches an overlapping down stream pressure as noted above.

With respect to the pressure ratio, it is noted that Hass specifically teaches a pressure ratio of 3.0 and 6.0 (p.3398 col.1). One skilled in the art after realizing Hass would know that different pressure ratios could be utilized and still obtain a similar product. Hence, it would have been obvious vary down stream pressure with the expectation of optimizing the deposition conditions to obtain the desired product properties.

Regarding claims 7-9, Hass specifically teaches a stationary substrate but that this resulted in spatial variation (p.3398 col.1). In another embodiment, the substrate could be rotated (p.3398 col.2).

Regarding claims 12, 15, Wadley teaches overlapping evaporation rates and have been addressed above.

Regarding claims 18-19, Hass teaches a YSZ source (p.3397 cols.1-2).

In independent apparatus claim 39, the applicant requires a chamber, an evaporant source, a carrier gas stream, an energetic beam, and a substrate. These limitations are met in Hass above.

Regarding apparatus claims 40-51, these issues have been discussed above.

**Claims 10-11, 13-14, 16-17, 20-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hass et al. (J. Vac. Sci. Technol. article) in view of Wadley et al.**

**(5,534,314).** Hass discloses an electron beam physical vapor deposition process for forming thermal barrier coatings by combining low vacuum with a carrier gas jet to rapidly transport the evaporant to the deposition surface as noted above. However, the reference fails to teach a specific diameter for the evaporant source.

Wadley teaches a similar process for directed vapor deposition using an electron beam evaporant which makes efficient use of evaporant source materials and provides rapid deposition as noted above. In one embodiment, Wadley teaches that the evaporant source can be 0.5-20 cm (.2-7.9 inches) in diameter (col.13 lines 8-34) which overlaps with the claimed range. It would have been obvious to utilize the claimed diameter in the process of Hass with the expectation of obtaining similar results because Wadley teaches the conventionality of using the claimed diameter.

The same issue applies to claims 11, 13-14, and 16-17.

Regarding claims 20-21, the applicant requires a specific composition. Wadley teaches the conventionality of varying composition (col.4 lines 26-27, col.6 lines 60-64). It would have been obvious to utilize the same composition or different composition in the process of Hass with the expectation of obtaining the desired product properties because Wadley teaches that it is conventional to vary same in an EB process.

**Claims 22-38, 52-57 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hass et al. (J. Vac. Sci. Technol. article) in view of Wadley et al. (5,534,314) and further in**

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**view of WO 01/90438.** Hass and Wadley disclose an electron beam physical vapor deposition process for forming thermal barrier coatings by combining low vacuum with a carrier gas jet to rapidly transport the evaporant to the deposition surface with a specific evaporation rate as noted above. Independent claim 22 further requires applying a substrate bias system to attract the flux and the use of a hollow cathode arc plasma. Wadley teaches of applying a bias voltage on the substrate (col.10 lines 38-43 and col.13 lines 44-60). However, Hass and Wadley fail to teach a hollow cathode arc plasma

WO '438 discloses an electron beam evaporation system which incorporates the use of a hollow cathode plasma arc discharge (p.8 lines 17-24) which generates the ionized gas in a focused flow (p.9 lines 3-6). It would have been obvious to utilize the hollow cathode plasma arc discharge in the process of Hass and Wadley with the expectation of obtaining a focused flow.

Regarding claims 23-25, Hass teaches a substrate temperature of 1000°C as noted above.

Regarding claims 26-27, Wadley teaches that the evaporant source can be 0.5-20 cm (.2-7.9 inches) in diameter.

Regarding claims 28-29, WO '438 discloses the use of a hollow cathode plasma arc discharge and thus would contain any benefit associated with its use.

Regarding claims 30-32, Hass specifically teaches a stationary substrate but that this resulted in spatial variation (p.3398 col.1). In another embodiment, the substrate could be rotated (p.3398 col.2).

Regarding claims 33-34, Hass teaches a YSZ source (p.3397 cols.1-2).

Regarding claims 35-36, Wadley teaches the conventionality of varying composition.



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Regarding claims 37-38, Hass teaches an electron beam.

In independent apparatus claim 52, the applicant further requires the use of a substrate bias system and a hollow cathode arc source. These issues have been addressed above.

Regarding apparatus claims 53-57, these issues have been discussed above.

### ***Double Patenting***

The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the “right to exclude” granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

**Claims 1-57 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-64 of copending Application No. 11/917585.**

Appl Number ‘585 discloses a method for forming a thermal barrier coating system by depositing a bond coat, depositing a TBC, and where one of those coatings are deposited by DVD. The current claims contain these steps with some additional limitations such as pressure

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and temperature. Specifying the pressure and temperature would have been obvious to one skilled in the art because pressure and temperature are routinely varied to optimize the deposition process.

This is a provisional obviousness-type double patenting rejection.

**Claims 1-57 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-89 of copending Application No. 10/584682.**

Appl Number '682 discloses a method for forming a coating by presenting a down stream pressure, an evaporant source, a primary carrier gas stream, and generating an evaporated vapor flux. It also specifies a substrate having a distal end and a proximal end. One skilled in the art after reading '682 would realize that given the successful deposition onto a hollow substrate, the same could be applied to a flat substrate. Hence, it would have been obvious to eliminate the substrate geometrical limitations with the expectation of success.

This is a provisional obviousness-type double patenting rejection.

**Claims 1-57 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-59 of copending Application No. 10/535364.**

Appl Number '364 discloses a method for forming a thermal barrier coating system by presenting a substrate, depositing a Ti bond coat, and depositing a zirconia or zirconia alloy layer. The present claims teach depositing a bond coat and a YSZ layer on a substrate with some

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additional limitations such as pressure and temperature. Specifying the pressure and temperature would have been obvious to one skilled in the art because pressure and temperature are routinely varied to optimize the deposition process.

This is a provisional obviousness-type double patenting rejection.

**Claims 1-57 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-15 of copending Application No. 10/522076.**

Appl Number '076 discloses a method for forming a thermal barrier coating system by presenting a substrate, forming a bond coat, forming dispersoids, and depositing a thermal insulating layer. The present claims teach depositing a bond coat and a YSZ layer on a substrate without forming dispersoids. To eliminate forming dispersoids would have been obvious with its corresponding loss of function.

This is a provisional obviousness-type double patenting rejection.

**Claims 1-57 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-29 of copending Application No. 10/533993.**

Appl Number '993 discloses a method for forming a thermal barrier coating system by presenting a substrate, forming a bond coat, forming dispersoids, and depositing a zirconia layer. The present claims teach depositing a bond coat and a YSZ layer on a substrate with some additional limitations such as pressure and temperature. Specifying the pressure and temperature

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would have been obvious to one skilled in the art because pressure and temperature are routinely varied to optimize the deposition process.

This is a provisional obviousness-type double patenting rejection.

**Claims 1-57 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-29 of copending Application No. 10/489090.**

Appl Number '090 discloses a method for forming a thermal barrier coating system by presenting a substrate, forming a bond coat, and depositing a thermal insulating layer. The present claims teach depositing a bond coat and a YSZ layer on a substrate with some additional limitations such as pressure and temperature. Specifying the pressure and temperature would have been obvious to one skilled in the art because pressure and temperature are routinely varied to optimize the deposition process.

This is a provisional obviousness-type double patenting rejection.

**Claims 1-57 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-22 of copending Application No. 10/476309.**

Appl Number '309 discloses a method for forming a coating by presenting a substrate at a specific pressure, and presenting an evaporant source and carrier gas stream, and partially coating a substrate. The present claims teach depositing a bond coat and a YSZ layer on a substrate with some additional limitations such as temperature. Specifying the temperature

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temperature would have been obvious to one skilled in the art because temperature is routinely varied to optimize the deposition process.

This is a provisional obviousness-type double patenting rejection.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Bret Chen whose telephone number is (571)272-1417. The examiner can normally be reached on 7:30am - 4:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Timothy Meeks can be reached on (571) 272-1423. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Bret Chen/

Primary Examiner, Art Unit 1792

2/13/09